Arizona EMS Treat and Refer Program Performance Measurement

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Abstract

Innovation in emergency medical services (EMS) is often limited by two things, reimbursement and supporting evidence. For at least two decades, EMS innovators have been attempting to create and implement viable programs that would allow EMS providers to navigate patients to destinations other than hospital emergency rooms. Today's healthcare environment is one of innovation, continually driving towards Evidence-based practices (EBP) and collaboration to improve patient care and eliminate unnecessary costs. In fact, the strategic plan for the U.S. Department of Health & Human Services, strategic goal number 1, includes "Reduce the growth of health care costs while promoting high-value, effective care (Secretary, 2015). In addition to this focus on cost control and quality of care, EMS agencies are collecting more data than ever before, using electronic patient care reporting platforms and reporting data to state data repositories. These two significant factors may combine to allow the successful implementation of alternate destination type programs, both effectively and safely.

Arizona has an alternate destination program that is in its infancy. The program, Arizona Treat and Refer (T & R), allows EMS agencies to implement guidelines that allow their providers to navigate EMS patients to destinations other than hospital emergency rooms, when the patient's condition allows. The program also has a financial sustainability component through Arizona's Medicaid administrator, the Arizona Health Care Cost Containment System (AHCCCS).

This paper will focus on the challenge of proving the effectiveness and safety of the program through data collection and analysis. It will provide readers a literature review on T & R type programs over at least the last decade and review the data collection requirements and recommendations of the state's T & R program.

Introduction

In March of 2014, a fire department from a large Arizona municipality ran a six-month pilot of a Treat and Refer (T&R) program. This program focused specifically on offering Emergency Medical Services (EMS) patients alternative patient destination options. Up to this point, EMS patients were limited to two basic potential dispositions. The first option would be having the patient transported to a hospital Emergency Room (ER) via an ambulance from the 9-1-1 system. In this particular city, this option occurred in 72% of EMS calls. The second option would be for an alert and oriented patient to refuse transportation. The patients who decided to refuse transportation would then be asked to sign an "Against Medical Advice" (AMA) form that was full of legal language attempting to absolve the EMS agency from liability in the event the refusal resulted in some untoward sentinel event.

The basis of the T&R pilot was to demonstrate that EMS providers had the ability to appropriately assess, treat, and triage patients to the most appropriate healthcare destination. The "referral" could be to an urgent care (UC), a clinic, a primary care physician (PCP), or to a behavioral health crisis center. In the event the medical issue was resolved by the paramedic's treatment, the patient could also simply be referred to stay home, requiring no additional treatment. The benefit to providing these additional destination options serve both the patients and the healthcare system. Patients potentially benefit in several ways by receiving their healthcare in the most appropriate setting. This can result in a more personalized care, faster care for lower acuity patients, and a substantial savings in cost of care. In addition to benefiting the patient, this program can positively impact the healthcare system by reducing unnecessary ER

traffic and ambulance use, keeping those resources available for patients who truly require them. These claims, of course, have yet to be substantiated and will be considered later in the paper.

While there are identified benefits to the T&R program, it is not without its challenges as well. The challenges, however, are often subtler. The first challenge lies in the core provider educational curriculum of the paramedics and Emergency Medical Technicians (EMTs). While these professionals receive excellent and comprehensive education on handling out-of-hospital medical emergencies, the curriculum development has not historically focused on the variety of patient destination options and the associated benefits and limitations of each option. Instead, it focused on treating patients emergently and transporting them to the closest appropriate hospital ER. This presents the question of a gap in the education of paramedics and EMTs and whether or not they even have the knowledge and skills to make complex destination decisions appropriately. This then, of course, raises the questions of patient safety, organizational liability, and the potential need for additional educational requirements.

The municipality's fire department continued on with the pilot, working closely with Medical Director Joshua Zeidler, to help ensure patient safety. Dr. Zeidler initially required a face-to-face follow-up attempt on every T&R patient within 4-6 hours after the 9-1-1 call to limit the concerns over patient safety and liability. The department also initiated a comprehensive, in house educational program to train all of the organization's providers on the details of the T&R pilot, including additional education surrounding the specific T&R treatment algorithms. At the end of the six-month pilot, the program was deemed a success and steps were taken to institutionalize T&R within the organization and to scale the development and provision of the program to other fire departments. While many of the initial program implementation challenges

were overcome, the fiscal sustainability of the program remained a significant issue. It was identified that the service delivery takes additional on-scene time, which most agencies can absorb as a fixed cost of EMS provision. However, the non-reimbursed medical supplies expenses and the additional administrative support required could prohibit many agencies from participating. The fiscal sustainability challenge was identified as a significant barrier that would limit scalability of T & R without significant support and strategies to overcome.

Arizona's Treat and Refer Program

In 2014, the fire department was able to set a meeting with the leadership of the Arizona Health Care Cost Containment System (AHCCCS), Arizona's Medicaid administrative organization, to present the T & R program. The focus of the presentation was to demonstrate the healthcare cost savings associated with the program and to ask AHCCCS to consider developing a cost recovery mechanism for EMS agencies.

All AHCCCS T&R Patients		Ambulance Transport	Emergency Room	Urgent Care	Primary Care	
	Average Cost*	$584.00	$438.00	$101.00	$68.00	
Outcome	**Count (Apr-Jun 2015)**					**Savings**
T&R to CP	4	$584.00	$438.00			$ 4,088.00
T&R to CR (Behavioral)	9	$584.00	$438.00			$ 9,198.00
T&R to ER	37	$584.00				$ 21,608.00
T&R to PCP	119	$584.00	$438.00		<$68.00>	$113,526.00
T&R to UC	20	$584.00	$438.00	<$101.00>		$ 18,420.00
Total	189			**Quarterly Savings**		**$166,840.00**
*Avg charge data from Mercy Care 2013/14 Chandler residents			**Annual Projection of Savings**			**$667,360.00**

Table 1

The fire department demonstrated a decrease in ambulance transportation from 72% of all EMS calls to approximately 54%. Much of this reduction in ambulance transportation was

correlated directly to the T&R program and represented significant cost savings in two areas. First was the associated savings with the ambulance costs. Each T&R call, where an ambulance transport is avoided, saves the patient's insurance payer, in this case AHCCCS, approximately $584.00 (Table 1). Second, each time a 9-1-1 patient is able to receive treatment at an urgent care as opposed to an ER, there would be an additional minimum savings of $337.00 realized. If AHCCCS could develop some type of cost recovery program, the program would be more sustainable for fire departments across the state, potentially allowing greater participation.

AHCCCS quickly acknowledged the potential savings and began working with the state's Department of Health Services (ADHS) to investigate and develop a statewide T & R program. Together, AHCCCS and

Treat and Refer Recognition Program Steering Committee	
Name	**Organization**
Michal Rudnick	AHCCCS
Sara Selek, MD	AHCCCS
Glenn Kasprzyk	American Medical Response
Danniel Stites, MD	American Medical Response
Don Herrington	Arizona Department of Health Services
Ben Bobrow, MD	Arizona Department of Health Services
Terry Mullins	Arizona Department of Health Services
David Harden	Arizona Department of Health Services
Thomas Dwiggins	Chandler Fire, Health & Medical Department
Val Gale	Chandler Fire, Health & Medical Department
Josh Meeker	Cochise Community College
Tomi St Mars	EMSC – Arizona Department of Health Services
Michael O'Drisoll	Gila County Health Services
Randy Karrer	Golder Ranch Fire District
Mark Venuti	Guardian Medical
Jim Broom	Healthcare Innovations
Franco Castro-Marin, MD	Honor Health
Mary Cameli	AFCA, Mesa Fire & Medical Department
Harry Beck	Mesa Fire & Medical Department
Rebecca Haro	North County Fire & Medical District
Toni Gross, MD	Phoenix Children's Hospital
Gene McDaniel	Phoenix Fire Department
Todd Harms	Phoenix Fire Department
John Gallagher, MD	Phoenix Fire Department
Les Caid	Rio Rico Fire & Medical District
Matt Eckhoff	Rio Rico Fire & Medical District
Ed Mezulis	Sedona Fire District
Bob Ramsey	Star West Tech
Jason Johnson, MD	Summit Regional Medical Center
Sharon McDonough	Tucson Fire Department
Keith Boesen	University of Arizona Poison Control Center
Kim Moore	Verde Valley Ambulance

Table 2

ADHS met with stakeholders from public fire-based EMS agencies and private ambulance-based EMS agencies to further investigate each agency's' interest in program participation. The positive results of those meetings lead to the development of a state-wide committee of stakeholders (Table 2), which worked closely with ADHS and AHCCCS to develop the state's first T & R recognition program. In an effort to reduce or eliminate the patient safety concerns associated with the program, the recognition requirements contain specific education and training minimums, along with a comprehensive follow-up and quality assurance program. The requirements are detailed in the state's Treat and Refer Recognition Program Manual (Arizona Department of Health Services, 2016).

To meet the fire department's original concern brought to AHCCCS, fiscal program sustainability, AHCCCS sought approval from the Centers for Medicare and Medicaid Services (CMS) to allow reimbursement under this recognition program to approved agencies. In October of 2016, AHCCCS Director Tom Betlach received a letter from the CMS San Francisco office, notifying him that T & R had been approved for reimbursement (Sam-Louie, 2016). AHCCCS and ADHS quickly updated their websites with the news and opened the application process for official recognition.

While the news of the official statewide T & R recognition program represents a tremendous accomplishment, there are still many hurdles and challenges for individual agencies in understanding the intricacies of the program and how to achieve successful implementation. This paper will provide a literature review of multiple T & R or treat and release programs that have been attempted, successfully and unsuccessfully, over the last ten years. The review will specifically attempt to identify key indicators of successes and failures that can be used in the

development of individual program implementation strategies to improve the likelihood of success. Finally, performance measures for T & R will be identified, using existing or slightly modified data elements from the National Emergency Medical Services Information System (NEMSIS) version 3.4 data dictionary, including matrices of how to utilize the measures to demonstrate program successes and improve provider and agency performance.

Literature Review

While there have been decades of attempts and pilots of T & R or similar programs, this literature review will focus on projects that have taken place within approximately the last ten years. Healthcare is a dynamic field and, as a result of out-of-control healthcare costs in the United States, has seen unprecedented federal regulation of reimbursement tied to quality of care. Even before the Patient Protection and Affordable Care Act of 2010, there had been regional and state efforts in many areas of the nation to try and gain control of rising healthcare costs and the quality of healthcare. Some of these efforts created environments where-in innovative programs like T & R would have increased stakeholder interest and support. Thus, maintaining a target of approximately the last ten years seems reasonable to correlate successes and failures of similar projects to the current environment.

EMS Provider Determinations of Necessity for Transport and Reimbursement for EMS Response, Medical Care, and Transport: Combined Resource Document for the National Association of EMS Physicians Position Statements

In 2011, Doctors Michael G. Millin and Brian Schwartz, along with Lawrence H. Brown evaluated the abilities of EMS providers, under current systems, to determine the necessity for EMS transportation versus not transporting patients deemed non-urgent. One of the key

objectives of this paper was to "… outline the literature examining EMS provider determinations of medical necessity and the provision of on-scene medical care without transport, and to serve as a resource document to the National Association of EMS Physicians (NAEMSP's) position statement on EMS Provider Determinations of Necessity for Transport…" (Millin, Brown, & Schwartz, 2011).

In their introduction, the authors cite a position paper written by NAEMSP acknowledging that EMS providers have, or should have, the ability to consider transportation and destination alternatives for EMS patients. They write, "transportation by alternate means or to an alternate destination may be appropriate" adding the caveat that the patients are "non-urgent" (Millin, Brown, & Schwartz, 2011). Additionally, they discuss the Neely Conference from 2004. During this conference, providers met to discuss and attempt to gain consensus on triage tools or algorithms that could be used by EMS providers to safely and accurately triage EMS patients to appropriate healthcare destinations. At that time, most EMS agencies operated under the "treat and transport" guideline, wherein the only non-transports were patients who refused transport. While the participants at the Neely Conference were unsuccessful in agreeing to the appropriate triage tool or algorithm, they "were able to reach a consensus that medical necessity-based triage decisions must refer patients to alternative means of care and/or transport, and not simply deny patients care" (Millin, Brown, & Schwartz, 2011).

The authors of this paper seem to agree that EMS providers have the ability to determine the medical necessity for ambulance transport and, alternatively, non-transport, but that additional training and strict medical oversight are requisite components for a successful T & R type program. One particularly interesting study cited in the paper was conducted in Akron,

Ohio. It was published under the name *Paramedic Initiated Non-Transport of Pediatric Patients* in 2006 and demonstrated remarkable success. One component they added to the nontransport process included a telephone follow-up evaluation with the responsible adult, which they were able to successfully do for 75% of the 704 patients included in the study. Of the whole, 2.4% of the patients designated for nontransport ended up being hospitalized. Interestingly, the authors acknowledge that hospitalization alone may not be a good indicator of the need for emergent medical transport. They write, "many patients admitted to a hospital do not arrive by ambulance or present to the ED (emergency department)" (Millin, Brown, & Schwartz, 2011).

The authors close with three substantial conclusions: "… EMS systems with exceptional educational resources, strong medical oversight, and comprehensive quality management programs may elect to implement paramedic-initiated nontransport (or alternative transport) policies… systems that do not possess the educational, physician oversight, and quality management resources necessary to implement and continuously evaluate such policies should not implement them… third party payers may be able to realize some cost savings by providing appropriate reimbursement for non-transport-related services provided by EMS systems that do possess adequate resources and choose to adopt these practices" (Millin, Brown, & Schwartz, 2011).

Giving EMS Flexibility in Transporting Low-Acuity Patients Could Generate Substantial Medicare Savings

In December of 2013, authors Abby Alpert, Kristy Morgan, Gregg Margolis, Jeffrey Wasserman, and Arthur Kellermann published this paper in an effort to demonstrate the potential Medicare savings that could be realized through T & R type programs. While their intent was

focused on potential financial savings, the authors did vet some of the common concerns with T & R and additionally discussed the Emergency Medical Treatment and Active Labor Act (EMTALA) as an additional potential hurdle to these types of programs. Regarding EMTALA they wrote, "Requiring EMS crews to consult with online medical control – that is, to receive direction from a physician via radio or telephone – and to always accede to the patient's wishes regarding ED versus non-ED care might reduce this concern" (Alpert, Morgantl, Margolis, Wasserman, & Kellermann, 2013).

Since this paper was written, there has been more discussion and vetting on EMTALA and how it may or may not apply to EMS. Dr. Brent Myers of Evolution Health testified regarding EMS and EMTALA in March of 2014 during the U.S. Commission on Civil Rights Briefing on Patient Dumping. At the time, Dr. Myers worked for the University of North Carolina School of Medicine and stated that "EMTALA does not apply to EMS if the ambulance is not owned and operated by a hospital receiving Medicare dollars…" (*U.S. Commission on Civil Rights, Briefing on Patient Dumping*, p.143-153). Additionally, Dr. Myers' testimony was supported during the briefing by Katherine Van Tassel J.D. from the University of Akron School of Law.

In reference to the more common concerns associated with T & R programs, the paper's authors wrote the following, "Pilot programs suggest that with supplemental training, medical oversight, and perhaps mobile forms of telemedicine, the use of alternative destination protocols might be feasible" (Alpert et al., 2013).

Reasons Why Patients Choose an Ambulance and Willingness to Consider Alternatives

This paper is particularly interesting in that it did not study the clinical aspect or implementation needs of T & R. Instead, the authors, Lalena Yarris, Raymond Moreno, Terri Schmidt, Annette Adams, and Heather Brooks, chose to examine the reasons patients choose ambulances and whether or not they would be willing to consider alternative transportation and/or destinations. While this examination may not help with specific program development and implementation strategies, identifying situations and conditions when patients are more likely to be open to alternatives may be beneficial information for program developers and providers. After excluding patients who were either too sick to participate, trauma patients, time sensitive patients, patients coming from interfacility transport, and a few other miscellaneous exclusion factors, the authors ended up surveying 315 patients.

Table 3 below shows the number of respondents who were willing to consider each type of alternative transportation. The authors were able to use this information to make an inference of which patients would be most likely to consider alternatives and categorize them in the following four groups.

1- Those who were unsure as to whether or not they needed to go to the ER for treatment

2- The uninsured

3- Those with no primary care physician, and

4- Those who had no other way to get to the emergency room.

The authors additionally noted "Patients who identified hospital EDs or urgent care centers as their usual care providers were more likely to consider alternatives than were those who identified a physician's office as their site of usual medical care" (Yarris, Moreno, Schmidt, Adams, & Brooks, 2006). In all, the paper reports that 75% of their respondents were interested in considering alternative transportation.

Alternatives to Ambulance Transportation Offered and Number of Respondents Willing to Consider Each Alternative

Alternatives Offered	Respondents Willing to Consider Offered Alternative, * n (%)
Coming to ED in car	194(61.6)
Coming to ED in taxi	177(56.2)
Having the ambulance take patient to a doctor's office or clinic	117(37.1)
Taking themselves to a doctor's office or clinic	81(25.7)
Being treated by paramedics and not transported	128(40.6)
Willing to accept any alternative	247(78.4)

*Respondents could have endorsed more than one transportation alternative, so the proportions will not sum to 100%. The denominator for each proportion is 315 subjects.

Table 3

A second question examined in this paper was whether or not the respondents would be willing to consider being transported to an alternate destination like an urgent care, doctor's office, or clinic. The authors reported that a significant number of respondents would have considered an alternate destination and another significant number would have considered being treated at home and not transported (Table 3). Again, intentionally ignoring whether or not T & R programs are cost-effective or safe, this group specifically intended to determine if alternative transportation and/or alternate destinations would be considered and/or desirable by their patient population. The authors concluded, "Although further studies are needed to establish the safety and cost-effectiveness of alternatives to ambulance transport to the ED, our results indicate that patients would be

interested in transportation alternatives if they were offered" (Yarris, Moreno, Schmidt, Adams, & Brooks, 2006).

A Prehospital Treat-and-Release Protocol for Supraventricular Tachycardia

In Alberta, Canada, in 2015, a retrospective cohort study was done evaluating the use of an existing treat and release algorithm by Alberta Health Services EMS. Although the algorithm had been in place for several years, the researchers elected to use data from 2010 – 2012 to evaluate how well the paramedics adhered to the algorithm (Appendix A) and, as a result, how often patients treated and released by EMS for supra ventricular tachycardia (SVT) re-presented into the EMS system or ER. While approving a treat and release algorithm for SVT seems a little counter-intuitive to most EMS providers and medical directors, this group justifies SVT as an appropriate condition for treat and release writing, "Paroxysmal supraventricular tachycardia (SVT) is a common cardiac dysrhythmia that rarely results in serious adverse events. Most EMS agencies providing advanced life support have protocols for the prehospital treatment of SVT" (Minhas, Vogelaar, Wang, Almansoori, Lang, Blanchard, Lazarenko, & Mcrae, 2015). They found 286 possible SVT patient care reports during the time frame of the retrospective study and, after evaluating each for inclusion criteria, ended up with 229 total encounters for their study.

Table 4 shows the Albert Health System inclusion criteria for the SVT treat and release algorithm. Of these 229 encounters, 67% were transported to the ER, 0.4% refused transport against medical advice, and 33% were treated and released under the protocol. Of the 33%, or 75 patients who were treated under the treat and release protocol, there were 14 re-presentations either into the EMS system or directly to the ER. Ironically, all 14 were from a single patient. Additionally, there were zero sentinel events among the 75 treat and release patient encounters. To this, the authors wrote, "The negligible adverse event risk found by this study is likely due, in part, to the inherently low adverse event incidence of SVT. This characteristic of SVT is what makes it an ideal candidate for consideration of a T + R (treat and release) protocol" (Minhas et al, 2015). The authors agreed that the SVT treat and release protocol "applied to a significant subset of patients presenting to EMS with SVT" and that correct application of the algorithm would result in very little re-presentation (Minhas et al., 2015).

AHS Emergency Medical Services Treat-and-Release Criteria for SVT
• The patient is between 18 and 65 years of age. • The patient has a history of recurrent SVT known to be responsive to adenosine or vagal maneuvers, without previous recurrence of SVT shortly following the treatment. • The patient does not have any concurrent acute illness. • The patient has remained asymptomatic and hemodynamically stable for at least 15 minutes post-conversion. • The patient has not experienced an episode of SVT requiring treatment in the past 24 hours. • The patient agrees and is comfortable with the decision not to be transported to the hospital at this time. • The patient has the means to immediately call 9-1-1 if symptoms recur, and EMS advised the patient to do this. • There is a responsible adult who will remain with the patient for at least 4 hours. • EMS has answered all patient questions about their care. • The patient has signed the release waiver on the SVT information sheet. • The patient understands and agrees to follow EMS recommendations for follow-up care. • The SVT treat-and-refer information sheet was left with someone at the scene.

Table 4

Is a Prehospital Treat and Release Protocol for Opioid Overdose Safe?

Earlier this year, The Journal of Emergency Medicine published a similar retrospective study, this time on treat and release for opioid overdose rather than for SVT. The article, *Is a Prehospital Treat and Release Protocol for Opioid Overdose Safe*?, conducted a retrospective study of several large studies on patients who were treated with Narcan by EMS for an opioid overdose, and then were not transported to the ER. A few of the studies cited did not use treat and release protocols, rather they allowed a patient refusal after treatment with in certain conditions. These were included in the review as the authors felt they could reliably add or detract from the validity or potential validity of an opioid overdose T & R algorithm. The studies reviewed included such organizations as Copenhagen (Denmark) Medical Emergency Care Unit, San Diego EMS, San Antonio Fire Department, and Helsinki EMS and totaled approximately 3,800 study participants. Consider the following details from each study:

- Copenhagen – 2,241 cases of opioid overdose and only 14 deaths within 48 hours <u>possibly</u> related to rebound opioid toxicity and 3 <u>likely</u> caused by rebound toxicity.
- San Diego EMS – 998 cases of naloxone administration followed by patient refusal of transport. Per the report, "… no deaths attributable to an opioid overdose … could be identified within 12 h of naloxone administration by EMS" (Kolinsky, Keim, Cohn, Schwarz, & Yealy, 2017).
- San Antonio Fire Department -1,700 patients treated with naloxone, 552 refused transport. Only two deaths within 30 days of the EMS encounter. One died of overdose from heroin and cocaine four days later, and the second died of a gunshot wound seven days after being treated by EMS for opioid overdose.

- Helsinki – 84 total opioid overdose patients treated and released by EMS with zero deaths within 12 hours, however, most of these patients were treated by a mobile intensive care unit that included an emergency physician.

After a thorough review of these studies, the authors concluded, “Current literature seems to support that a treat and release EMS protocol might be safe in patients who return to baseline and are hemodynamically stable after receiving naloxone” (Kolinsky et al., 2017).

Towards Primary Care for Non-Serious 999 Callers: Results of a Controlled Study of "Treat and Refer" Protocols for Ambulance Crews

In the United Kingdom, they maintain 999 as their emergency phone number, much like the 911 system here in the United States. In 2004, a study was published in the *Quality and Safety in Health Care* journal that evaluated the effectiveness of using T & R protocols for EMS crews in West London. Two areas were chosen that had similar demographics, one to be the study sample group and one to be the control group. After developing the T & R algorithms, the crews at one station were trained in the new service delivery model while the crews at the control group station maintained their standard service delivery model.

The authors of this study reviewed several previously published studies on treat & refer/release that had highlighted some issues and concerns regarding this type of service delivery model. However, the authors felt that these studies “have been shown in a recent review to be methodologically weak, with varying methods used to assess appropriateness of care and safety, and no randomized controlled trials have been completed in this field” (Snooks, Kearsley, Dale, Halter, Redhead, & Cheung, 2004). The authors decided to develop a study that would

create specific T & R algorithms or protocols for the EMS providers to follow that would guide the providers to make consistently appropriate patient disposition decisions.

One interesting note regarding the roll-out of this program for the study is that they focused very little on additional clinical content for the providers. The trainers taught the crews the new algorithms, did some scenario based training, and then administered some testing to evaluate competence. That part of the training comprised the first day, and day two was focused primarily on recent changes to their healthcare system and local resources, specifically those applicable to the EMS service and T & R. As could be predicted, the study leads quickly recognized the need for additional clinical training for the T & R providers. They developed and provided two additional half-days of training that focused on assessment, decision making skills, protocols, and "the taking of a consistent and systematic history including the measurement and documentation of clinical observations" (Snooks, et al., 2004). Through the course of the trial period in 2000, they ended up qualifying 251 patients in the intervention group and 537 in the control group. From the patient care reports, they analyzed different vital signs, the documentation of patient assessments, job cycle times, and customer satisfaction.

Median Job Cycle Times			
	Conveyed (minutes)	Non-conveyed (minutes)	P value (95% CI of difference)
Intervention Group	59	35	<0.0001 (18 to 26)
Control	54	27	<0.0001 (24 to 29)

Table 5

The job cycle times findings were particularly interesting and something not reported in the other studies reviewed here. The reviewers found that crews were on scene a median time of eight minutes longer for non-transported patients in the intervention group than in the control

group (Table 5). However, predictably, in both the intervention and the control groups, non-transport job cycle times were substantially shorter than transport job cycle times overall.

Patient Satisfaction Scores by Study Group			
Satisfaction Items	**Intervention Group % Strongly Agree**	**Control Group % Strongly Agree**	**P value (95% CI of difference)**
Ambulance crew listened very carefully to my problem	63% (22/35)	51% (37/72)	0.30 (-7 to 27)
Crew were very polite	70% (26/37)	62% (47/76)	0.41 (-10 to 26)
Right amount of advice	69% (24/35)	46% (33/71)	0.04 (2 to 37)
Reassured by advice	72% (23/32)	45% (31/69)	0.02 (6 to 41)
Satisfied with explanation	69% (22/32)	49% (33/67)	0.09 (0 to 35)
Clear advice about when to get more help	71% (22/31)	47% (33/70)	0.03 (3 to 38)
Generally satisfied with the ambulance crew	81% (30/37)	58% (44/76)	0.02 (6 to 39)
	% strongly disagree	**% strongly disagree**	
Made to feel wasting the crew's time	52% (17/33)	38% (25/66)	0.28 (-6 to 31)

Table 6

While job cycle times are certainly a consideration when implementing a T & R program, especially in a busy system, the correlating patient satisfaction scores may be a more important consideration (Table 6). The authors reported the following: "A higher percentage of non-conveyed patients in the intervention group strongly agreed that their ambulance crew gave them the right amount of advice; that they were reassured by the advice; that they were given clear advice about when to get more help; and that they were generally satisfied with the ambulance crew" (Snooks, et al., 2004).

Perhaps the increase in customer satisfaction alone is reason enough to develop and implement T & R protocols as an updated service delivery model for EMS agencies. The authors concluded: "The lessons learned about the design and implementation of "T & R" protocols are valuable for taking the work forward, but to fully realize the potential benefits of this innovative

change in service delivery these issues will need to be addressed in further research and/or service development work" (Snooks, et al., 2004).

According to the published study, the following is the list of "key messages" from the authors:

- The introduction of ''T & R'' protocols did not lead to an increase in the number of patients left at the scene.
- Increased job cycle times associated with the use of ''T & R'' protocols may lead to less ambulance availability for response to other more serious calls.
- Protocols were used by all the crew members trained in their use, although not for all appropriate cases.
- Overall, documentation of clinical assessments was higher in the intervention group than in the control group.
- Concerns were identified with the safety of current usual practice and of practice using the protocols.
- Patients attended by crews trained in the use of the ''T & R'' protocols expressed higher levels of satisfaction with some aspects of care—particularly those related to communication of advice—than those attended by crews acting according to their usual practice.
- The need to develop the 999 service to improve the quality and appropriateness of service provided to patients is widely recognized, but this study confirms that changing practice is complex and effects sometimes unanticipated.

Alternatives to Traditional EMS Dispatch and Transport: A Scoping Review of Reported Outcomes

This 2015 paper sought to evaluate and catalogue outcomes that were used in innovative EMS programs providing alternative dispatch protocols or alternatives to ER transport. In the data synthesis, the researchers included 33 different reports surrounding programs, pilots, or evaluations of alternatives to EMS transport. Among those 33 papers, 50 unique outcomes were

reported, most commonly referencing patient safety and resource utilization. Appendix B shows a brief summary of the papers examined, along with each papers' service studied and their specific outcomes reported. According to the authors, "Thirty-three reports were categorized as alternatives to EMS transport to the ED, all of which were from paramedic-based systems. Sixteen studies were from the UK, 13 were from the US, two from Australia, one from Sweden and one from Canada" (Jensen, Carter, Rose, Visintini, Bourdon, Brown, Travers, 2015). While the healthcare systems vary greatly between these countries, there may be enough similarities between the EMS systems to draw some conclusions from their data. Certainly, many of the outcomes measured would align with the desired outcomes and concerns of implementing programs of these types in American EMS systems.

Appendix C looks specifically at these outcomes by the category reported in the various papers. The categories utilized by the researchers were as follows: clinical, safety, service utilization, patient satisfaction, cost, accuracy of decision, process outcome, and other. One challenge of comparing outcomes between the various papers was noted by the authors. They wrote, "This review revealed that similar outcomes are measured in many different ways. For example, adverse events have been examined by asking patients directly, through retrospective examination of health records, and through panel assessments of whether decisions were safe" (Jensen et al., 2015).

Additionally, the report acknowledges that the reviewed papers spanned over two decades and that EMS systems have changed significantly during this period. So much so, that some limitations and/or outcome measures that were legitimate two decades ago, may not be considerations at this time. The authors concluded, "Researchers and program leaders should

achieve consensus on the most important outcome measures to be used in future research studies, program evaluations and quality assessments of these programs" (Jensen et al., 2015).

Can Medical Decision-Making at the Scene by EMS Staff Reduce the Number of Unnecessary Ambulance Transportations, but Still Be Safe?

In June of 2015, a small group of researchers conducted a retrospective analysis of patients who were discharged directly from the EMS scene rather than being transported to a hospital ER in Shiraz, Iran. Shiraz is a city of about 1.7 million people that lies about 100 miles off the Persian Gulf in Iran. In the Shiraz EMS system, it is a commonly used practice for the EMS crews to evaluate a patient and then discharge the patient directly from the EMS scene without transport to a hospital. Often, the EMS provider will discuss the patient's condition with a physician at their dispatch center to help determine the correct course of action. However, the authors reported, "…who decides whether the patient should be transported to the hospital or not, however, no special protocol is used" (Peyravi, Örtenwall, & Khorram-Manesh, 2015). Additionally, they reported that no evaluation of the system's effectiveness and/or safety for the patients had ever been done. Their objective in this retrospective study was to evaluate the outcomes of Shiraz EMS's procedures utilizing a one-year period from March 21st, 2012 through March 20th, 2013. During that time, Shiraz EMS encountered 81,999 patients. The authors did not report the total number of patients discharged from the EMS scene during the study period, however they did report that it accounted for an estimated 36% of their total patients. For purposes of the study, they chose to evaluate a sample population of 3,019. Of the 3,019 patients identified in the sample, they were able to successfully follow up with 994 patients or patient families.

One of the most concerning outcomes reported from this study was the fact that 51 of the 994 patients had died within the 4-12 months after the EMS call but before the follow-up was completed. Unfortunately, due to the current Iran practices in these types of situations, information on the causes of the deaths was not available. Additionally, there is no way to correlate the death rate to those patients who enter the EMS system in the United States. The study did report that the death rate for those patients discharged from EMS after definitive treatment or advice did not differ from those patients who chose not to be transported to the hospital by EMS. This could imply that the death rate is not unusual or unique to the population studied.

The authors conclusion may be the best bit of information gleaned from the study: "We advocate a correct selection of patients discharged from the scene or left at home by EMS. Using a standardized protocol, which eliminates the bias made by different staff and physicians may safeguard this process. The results could be indicative for a prospective study and have an impact to improve the process and selection of the patients that should be transported to the hospital or can safely be discharged directly" (Peyravi, Örtenwall, & Khorram-Manesh, 2015).

Should Payment Policy Be Changed to Allow a Wider Range of EMS Transport Options?

The authors introduce the topic of changing policy payment focusing on Medicare reimbursements with the following language in the paper's abstract:

> The Institute of Medicine and other national organizations have asserted that current payment policies strongly discourage emergency medical services (EMS) providers from transporting selected patients who call 911 to non-ED settings (e.g., primary care clinics, mental health centers, dialysis centers) or from treating patients on scene. The limited literature available is consistent with the view that current payment policies incentivize transport of all 911 callers to a hospital ED, even those who might be better managed elsewhere… In light of growing concerns

> about the high cost of emergency care and heavy use of EDs, assessing EMS transport options should be a high-priority topic for outcomes research (Morganti, Alpert, Margolis, Wasserman, & Kellermann, 2014).

As a result of discussions and recommendations like this, the US Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response determined it was necessary to explore the subject of Medicare EMS reimbursement further. To this end, the services of the RAND Corporation, a non-profit think tank, were secured to research and help provide a better understanding of whether or not changes to these reimbursement policies were even a possibility. In 2013, RAND began a search of published articles under the following search terms:

- Emergency medical services
- EMS
- Paramedic
- Treat and release
- Non-emergency department
- Non-ED
- Non-emergent
- Transport
- Alternative transport
- Low acuity
- Community paramedic
- Transportation of patients

During the development of their literature synthesis, they learned that this topic has been discussed and even recommended by several different organizations for over a decade. Included are several of those statements.

The Emergency Medical Services Agenda for the Future (1996)

"The Health Care Finance Administration (HCFA), and others responsible for establishing policy with regard to EMS payment, must eliminate patient transport as a requirement for compensating EMS systems. Patient assessment and care delivered, regardless of whether or not transport occurred, must be recognized and compensated appropriately. Additionally, the cost of system preparedness should be recognized. Alternative models for determining rates of reimbursement must be developed."

The National Association of EMS Physicians and the American College of Emergency Physicians (2001)

"EMS systems may encounter patients who do not need advanced life support care or evaluation at an emergency department. In these circumstances, transportation by alternate means or to an alternate destination may be appropriate."

The Institute of Medicine Committee on the Future of Emergency Care in the US Health System (2007)

EMS payment policies "…are suspected of adding unnecessary costs to the health care system and burdening already over-burdened hospital-based providers". The Institute of Medicine recommended CMS "investigate whether Medicare and Medicaid payment methodologies should be revised to support payment for emergency care services in the most appropriate setting (including treat and release)".

The National Association of EMS Physicians (2011)

"There may be potential for emergency medical services (EMS) providers to avert unnecessary emergency department visits by providing a medical assessment to determine whether patients can be managed without emergency transport to an acute care facility".

As the authors further developed their literature synthesis, they sought to address the following questions:

1. What is CMS' current EMS reimbursement policy?
2. What portion of EMS transports might be safely managed in alternate care settings?
3. Can EMS providers accurately identify patients who can be safely managed in non-ER settings?

While their paper considers all three of those areas, for purposes of this review, the concentration will be surrounding EMS providers safely and accurately identifying patients who can be appropriately managed with alternative transportation and destination options. There were several consistencies noted among the different papers and demonstration projects. First, there were instances of EMS personnel under triaging patients. They reported varying ranges of under triaging from 3% to 32%. Unfortunately, the range is too large and the methods of determining under triage rates too inconsistent to aggregate all the data. The authors felt that guidelines, and strict adherence to the guidelines, were beneficial in limiting under triage. Additionally, the authors reported that although some of the projects attempted to demonstrate the safety of providing more appropriate destination alternatives by pre-hospital providers, they reported the following: "Unfortunately, few described or evaluated their efforts with sufficient rigor to

support confident conclusions about the accuracy, safety, and effectiveness of the options used" (Morganti, Alpert, Margolis, Wasserman, & Kellermann, 2014).

This paper provides some of the most compelling and comprehensive reviews of alternative destination projects that have taken place around the world. Still, the authors seem to believe that the concept lacks the support of CMS' reimbursement strategies and that definitive evidence of patient safety has not yet been demonstrated. They conclude: "Although there are potential benefits to allowing EMS personnel to treat carefully selected patients on scene or transport them to alternative destinations, there are unanswered questions about the strategy's feasibility and safety. The few evaluations conducted to date are interesting but inconclusive… In light of growing concern about the high cost of emergency care and heavy use of EDs, this issue should be a high-priority topic for outcomes research" (Morganti et al., 2014).

The Demand for Data

The discussion points and conclusions of these articles demonstrate several consistencies. The idea of "T & R" type programs operating In the EMS field has merit. Additionally, it seems consistent that these programs will require algorithms specific to call types for providers to follow and that they should receive additional training and follow-up on their performance in following the algorithms. Further, CMS should review current reimbursement policies, such as the unintentional incentivization of ambulance transports. Finally, and probably the most pertinent and important to the success of T & R in Arizona, the need to clearly demonstrate the benefit to the patient and to the healthcare system, and that patient safety remains a satisfied priority through this program.

Dr. Gregg Margolis, co-author of *Should Payment Policy Be Changed to Allow a Wider Range of EMS Transport Options?* and Director of the Division of Health Systems and Health Policy for the US Department of Health & Human Services, is a cautious, yet avid supporter of innovations in EMS. He strongly suggests clearly identifying the problem a new program is trying to solve and then developing performance indicators that would lead to a definitive determination as to whether or not the new program addressed the problem safely and successfully. T & R in Arizona has one clear mission, **to better and more appropriately navigate patients who enter the health care system through EMS to definitive care**. Obviously, there are ancillary benefits to achieving this mission that could support its effectiveness. These could include:

- Cost avoidance/savings for both the payer and, in most cases, the patient.
- Decreased burden on the already crowded hospital emergency rooms.
- Keeping valuable EMS resources (ambulances) available for emergency use.
- More personalized care and coordination of care for patients navigated back to their primary care.

Many of these benefits are difficult and cumbersome to support through data collection and analysis. Additionally, data collection and reporting have historically been a significant weakness for EMS agencies. Recently, with the national push of the National Emergency Medical Services Information Systems (NEMSIS) data dictionary and state EMS data repositories, the collection and analysis of EMS data have improved dramatically. These factors suggest that EMS is ready to collect and provide data that could demonstrate the safety and effectiveness of the T & R program. Even so, the focus should probably remain centered around

the simplest and most important aspects of the program. The following list of performance indicators could be used to demonstrate the T & R program efficacy.

1. Was the patient navigated to the most appropriate health care setting?
2. Was the patient's outcome at least as good as if they went by ambulance to the ER?
3. Did the patient represent into the EMS system within 72 hours? (same or related issue)
4. Were there sentinel events associated with specific aspects of the alternate transportation/destination program?
5. Was the patient satisfied with the service?
6. Was the reason for the patient calling 911 resolved?
7. Did the T&R avoid unnecessary patient and/or payer cost?
8. What are the optimal demographics and/or call type(s) for T & R?
9. Which T & R algorithms are appropriate and successful, including consistent provider adherence to the algorithms?

In addition to demonstrating the value and safety of the T & R program through this data collection and analysis, Dr. Margolis also stresses the importance of demonstrating that there is no negative impact on the existing EMS service delivery. The EMS COMPASS project is a current National Highway Traffic Safety Administration (NHTSA) funded project that is developing evidence based EMS performance measures. EMS COMPASS has effectively developed 14 of these measures that are currently out for public comment. EMS leaders can participate in this project through public comment and/or guideline testing. A quick visit to emscompass.org provides an orientation to the project and participation. Another good resource for suggested EMS benchmarking performance measures is the 2007 paper *Evidence-Based*

Performance Measures for Emergency Medical Services Systems: A Model for Expanded EMS Benchmarking (Myers, Slovis, Eckstein, Goodloe, Isaacks, Loflin, Mechem, Richmond, & Pepe). They recommend the following performance indicators as "Key Treatment Elements":

ST-Elevation Myocardial Infarction (STEMI)

- Aspirin (ASA), if not allergic
- 12-Lead electrocardiograph (ECG) with prearrival activation of interventional cardiology team as indicated
- Direct transport to percutaneous coronary intervention (PCI) capable facility of ECG to PCI time < 90 minutes

Pulmonary Edema

- Nitroglycerin (NTG) in absence of contraindications
- Noninvasive Positive Pressure Ventilation (NIPPV) preferred as first-line therapy over endotracheal intubation

Asthma

- Administration of beta-agonist

Seizure

- Blood glucose measurement
- Benzodiazepine for status epilepticus

Trauma

- Limit non-entrapment time to < 10 minutes
- Direct transport to trauma center for those meeting criteria, particularly those over 65

Cardiac Arrest

- Response interval < 5 minutes for basic CPR and automated external defibrillators (AEDs)

Of course, not to be ignored, would be the demonstration of emergent response times. Considering the potentially drastic variance in response times between systems, measuring an

agency's response time against a particular benchmark may not be the most appropriate way to show consistent service delivery. Perhaps a better indicator would be 90th percentile code-3 response times, comparing data before and after implementation of the program. It may be important to allow a short period of institutionalization after implementation, then comparing the response data after that period with the same month's data from a previous year, of course taking into consideration any changes in system call volume and/or resource allocation/distribution.

While not entirely comprehensive, these bench marks could be a basic starting place for organizational EMS system performance measurement that can demonstrate consistent service delivery before and after the implementation of T & R. In other words, demonstrating that the new program has not negatively impacted the existing service delivery.

With the desired performance indicators for EMS identified and some basic concepts of what to demonstrate regarding the T & R program, the next logical step would be to develop the list of data elements to be collected for both the existing EMS service delivery and the T & R program.

Methodology for Data Collection and Analysis

EMS systems throughout the nation are using electronic patient care reporting (ePCR) platforms more than ever before to document patient encounters. This data collection typically occurs during the patient encounter and is performed by a crew member typing or tapping the information into a ruggedized laptop or tablet. The platforms used most commonly throughout the nation allow for data collection and entry following standards set forth by the National Emergency Medical Services Information System (NEMSIS). NEMSIS develops and releases a

data dictionary of all the suggested data elements. The state of Arizona, under the direction of the Department of Health Services, then develops a state data dictionary that contains all of the data elements that can be collected and submitted through Arizona's Prehospital Information & EMS Registry System (AZ-PIERS).

In May of 2016, Arizona EMS advisory groups, the EMS Council and the Medical Direction Commission, unanimously approved the document *Arizona Treat and Refer Program: A monitored, community specific, and clinically grounded effort to enhance the healthcare continuum for Arizonans*. This document outlines the requisite criteria for becoming a recognized T & R agency. The document states: "All recognized treat and refer programs must collect and submit data to the Bureau of EMS and Trauma System following the AZ-PIERS v3 data standard" (Arizona Treat and Refer Program, 2016). By submitting to the bureau following the AZ-PIERS v3 data standard, the majority of the requisite and recommended data collection for the T & R program is done. (See appendix D for a complete list of the required data elements. This list will also contain the additionally required data elements specific to the T & R program.)

In addition to the normally required EMS data sets, the state set forth a few additional required data elements to be collected in order to demonstrate the program's effectiveness and safety. Every effort was made to minimize this list of extra required data elements for two reasons. First, to try and keep the on-scene data entry from becoming overly cumbersome, and second, to limit the customization required on each ePCR platform to collect the data. These additional data include, as shown in Table 7, custom added values specifying the type of destination the patient was referred to (eDisposition.21). There is also one custom added data element designed to simply record the follow-up success rates. This data element is called the Community Health Follow-up Outcome (itOutcome.023) and has four simple follow-up outcomes: follow-up successful, no method to contact the patient, no follow-up attempted, or follow-up attempted but unable to make contact. These data elements are designed to all be incorporated into the existing ePCR platform, using the NEMSIS v3 standard. This leverages the state's existing EMS data collection platform, AZ-PIERS, to be utilized to warehouse the T&R data.

Custom Treat and Refer Required Data Elements (including drop-down lists)

- Custom values added to existing values for Type of Destination (eDisposition.21)
  - it4221.103 'Behavioral In-Patient'
  - it4221.102 'Behavioral Out-Patient',
  - it4221.101 'Dialysis Center'
  - it4221.100 'Hospice'
- Custom added data element
  - Community Health Follow-up Outcome (itOutcome.023):
    - itOutcome.023.100 'Follow-up Successful'
    - itOutcome.023.101 'No method to contact patient',
    - itOutcome.023.102 'No Follow-up attempted'
    - itOutcome.023.103 'Follow-up attempted, not able to contact'

Table 7

In addition to the basic data collection that occurs on scene, the state's program requires "evidence of efforts to assess customer satisfaction with the treat and refer service" (Arizona Treat and Refer Program, 2016). The decision on how to assess customer satisfaction is left to each organization. Some may choose mailed or e-mailed surveys, others face-to-face or phone interaction, and others may choose to develop some type of text based customer satisfaction survey. Sample questions could be:

- During the emergency visit, did the crew treat you with courtesy and respect?
- During the emergency visit, did the crew listen carefully to you?
- To what degree do you feel that the crew provided you with compassionate, personalized care?
- During the emergency visit, did the crew explain the treatment options in a way you could understand?
- To what degree do you feel comfortable with the treatment options that were presented?
- How satisfied are you with your choice to not utilize an ambulance in this emergency?

Some other important information to gather could be surrounding how well the patient followed through with the referral and what their experience was. For example:

- After the crew's initial response, did you seek additional medical attention?
- How soon after the crew's initial response was additional medical attention received?
- If additional medical attention was received, what type of facility did the patient present to?
- If additional medical attention was received, was the provider able to resolve your issue?

Questions like these will give a clear indication regarding the effectiveness and safety of the T & R encounter for those patients who choose to fill out the survey or who the follow-up team is able to contact.

One potential negative outcome that must be measured is the occurance of any sentinel events associated with T & R. A sentinel event is defined by the Joint Commission as "an unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof. Serious injury includes loss of limb or function" (Sentinel Events, 2013). Occurance of a sentinel event can be found through the patient follow-up process and/or customer satisfaction survey process. Additionally, hospital outcome data or the occurance of the patient representing into the EMS system can help to provide this type of data in the event it occurs. Sentinel events would not be reported through the NEMSIS data, rather that would be a specific reporting circumstance to be discussed with the agency's medical director. Sentinel events could also be discussed during the Department of Health Services Medical Direction Commission and/or Emergency Medical Services Council Meetings, especially when the circumstance could suggest a programatic or algorithmic change is needed.

The importance of good data collection in this project cannot be overvalued. As shown earlier in this paper, there have been many T & R type demonstration projects or pilots that have been done across the country and even around the world. However, as clearly articulated in the literature synthesis *Should Payment Policy Be Changed to Allow a Wider Range of EMS Transport Options?;* "Unfortunately, few described or evaluated their efforts with sufficient rigor to support confident conclusions about the accuracy, safety, and effectiveness of the options

used… there are unanswered questions about the strategy's feasibility and safety. The few evaluations conducted to date are interesting but inconclusive…" (Morganti et al, 2014).

While the program is still in its infancy, organizations in Arizona have already provided this T & R service to over 4,000 patients. As the program expands to multiple organizations offering the service, this patient count will grow exponentially. Combined with the support of Arizona's Department of Health Services and Arizona's Medicaid administrator, Arizona Health Care Cost Containment System (AHCCCS), this program is perfectly positioned to provide the evidence to clearly demonstrate whether or not T & R can be safely and effectively implemented in EMS systems around the nation and, perhaps, provide a framework that can be duplicated in similar systems.

Conclusions and Recommendations

Since the exciting announcement from AHCCCS regarding support for this program moving forward throughout Arizona's Medicaid population, much work and progress has been made. In just over a year, the program manual and ADHS's recognition application were developed by stakeholders across the state. The Center for Medicare and Medicaid Services (CMS) approved T & R services on October 1st of 2016. Later that same month, CMS approved reimbursement rates for T & R outcomes. On October 31st, 2016, Golder Ranch Fire District became the first organization recognized as a T & R EMS agency by ADHS. This was followed in 2017 by the Chandler Fire, Health & Medical Department in January, Surprise Fire-Medical Department in February, and Buckeye Fire-Medical-Rescue Department in April, with several additional agencies in various stages of organizational training and application preparation.

As mentioned earlier, every ADHS recognized T & R agency is required to submit their T&R call data to the AZ-PIERS system. As the number of agencies participating in this program increases, this data base will continue to grow and, inevitably, provide the data to demonstrate the programs safety and effectiveness. As this happens, EMS agencies across the country may be able to build on the efforts in Arizona to replicate safe and effective T & R programs in their jurisdictions. In December of 2016, the National Emergency Medical Services Advisory Council (NEMSAC) wrote an advisory entitled *EMS Funding and Reimbursement*. In it, the authors write "Acknowledging that not all patients require a trip to the ED, but that the assessment and care provided to such patients remains valuable, is an important step toward bringing financial stability to the industry and reducing overall health care expenditures" (National Highway Traffic Safety Association, 2016). Designing a program that is safe and effective, along with a system to demonstrate its safety and effectiveness is imperative to institutionalizing this type of service provision for EMS.

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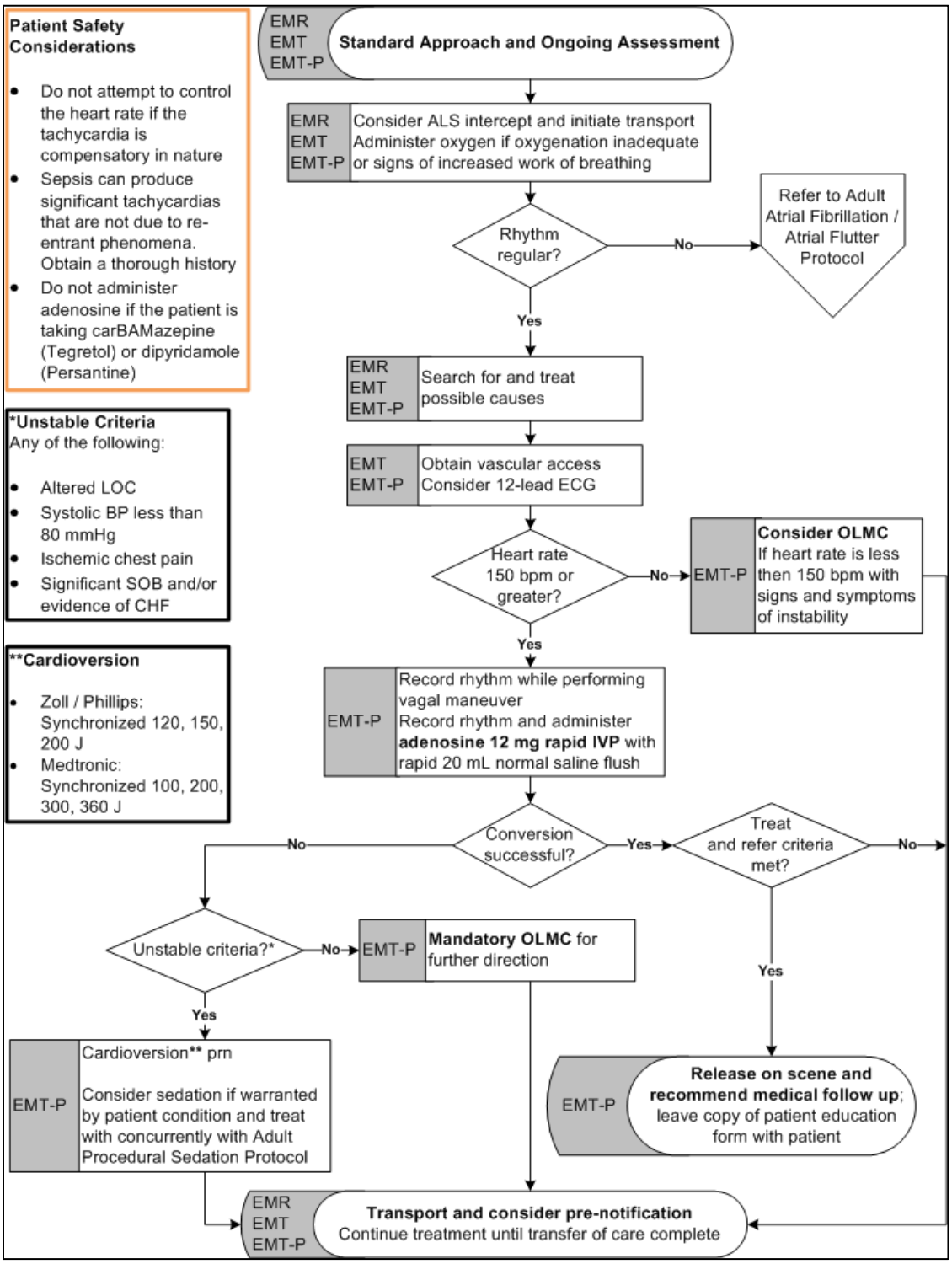
Appendix A

Alberta Health Services - Supraventricular Tachycardia



Appendix B

Characteristics and outcomes reported: Alternatives to EMS transport studies **(Partial table from published article.)**				
First Author	**Year of Publication**	**Country**	**Service Studied**	**Direction of Evidence**
Alpert	2013	USA	Call or refer to other health service	Supportive
Jensen	2013	Canada	Expanded scope EMS	Supportive
Gray	2008	UK	Expanded scope EMS	Supportive
Halter [52]	2008	UK	Expanded scope EMS	Supportive
Halter [53]	2007	UK	Expanded scope EMS	Supportive
Mason	2007a	UK	Expanded scope EMS	Supportive
Mason	2007b	UK	Expanded scope EMS	Supportive
Halter	2006	UK	Expanded scope EMS	Supportive
Snooks	2004	UK	Treat and Release (includes assessment tools to leave patients)	Supportive
Cooper	2004	UK	Expanded scope EMS	Supportive
Lerner	2003	USA	Treat and Release (includes assessment tools to leave patients)	Supportive
Schaefer	2002	USA	Call or refer to other health service	Supportive
Coates	2012	UK	Expanded scope EMS	Neutral
Dixon	2009	UK	Expanded scope EMS	Neutral
Knapp	2009	USA	Alternative mode of transport to ED	Neutral
Cooper	2008	UK	Expanded scope EMS	Neutral
Mason	2008	UK	Expanded scope EMS	Neutral
Hjalte	2007	Sweden	EMS-initiated non-transport (includes determinations of medical necessity)	Neutral
Haines	2006	USA	EMS-initiated non-transport	Neutral
Halter	2005	UK	Treat and Release (includes assessment tools to leave patients)	Neutral
Snooks	2004b	UK	Call or refer to other health service	Neutral

Gratton	2003	USA	EMS-initiated non-transport (includes determinations of medical necessity)	Neutral
Haskins	2002	USA	Expanded consult by EMS (e.g. telemedicine)	Neutral
Schmidt	2001	USA	EMS-initiated non-transport (includes determinations of medical necessity)	Neutral
Hauswald	2002	USA	EMS-initiated non-transport (includes determinations of medical necessity)	Opposing
Silvestri	2002	USA	EMS-initiated non-transport (includes determinations of medical necessity)	Opposing
Kamper	2001	USA	EMS-initiated non-transport (includes determinations of medical necessity)	Opposing
Pointer	2001	USA	EMS-initiated non-transport (includes determinations of medical necessity)	Opposing
Zachariah	1992	USA	EMS-initiated non-transport	Opposing
**The paper identified four additional studies that evaluated a singular protocol without a specified "direction of evidence given)*				

Appendix C

Outcomes categories and measurement considerations **(Partial table from published article.)**	
Outcome Category	**Measurement Considerations**
Clinical	None given
Safety	• Criteria should include consideration if cause of death was for a reason unrelated to EMS call. • Define ideal length of time to follow patients, for example: 24 hours, 48 hours, 28 days. • Options for data collection are to contact patient to determine outcome after non-transport or from clinical or administrative data (including EMS dispatch, EDs, hospital, family physician, other). • Consensus needed for what is considered a "complication." • Data may be collected from patients or chart review. • Consensus required on adverse event definitions, such as: A serious adverse event is "an unpredicted death or admission to hospital within two weeks of the original attendance." An adverse event is "an unpredicted use of the health service within two weeks of original attendance."
Time	• Choose time points in which data entry for these fields by dispatch, EMS clinicians or hospital staff is mandatory, to minimize missing data. • Consensus required on clear definitions for each time point and interval. Report each time point and interval clearly.
Service Utilization	• Clearly define study patients, e.g., number of calls referred/total eligible calls. • Consensus required on what a "successful" referral is, e.g., calls that are referred and referral agency does not return call back to 911. Reported as: number of calls "successfully" referred/total eligible calls. • May be defined as: number of EMS responses for all EMS patients, for all those eligible for response, or for those pre-enrolled in alternative program. • EMS calls are reviewed and judged if unnecessary by an expert panel. Multidisciplinary panel should be independent from study and members should have an understanding of EMS practice. • May be defined as: how many previous EMS calls appear to meet criteria for alternative program. • A non-transport may be defined as paramedics not transporting the patient from scene. There could be various reasons. • Consensus on which system performance measures are most important, e.g., emergency call response time. • Between 0 – 28 days after EMS episode
Patient Satisfaction	• Collect by follow-up patient interview.

Cost	• Clearly report what costs are included in analysis. • Categorize methodological approach if potential savings/cost or actual savings/cost.
Accuracy of Decision	• Decision should be categorized and reported by provider type. • Paramedic documented decision compared to patient outcome or expert panel decision and reported with sensitivity and specificity. • Paramedics answer the following questions for each patient (standard paramedic management delivered): “Could this patient have been safely transported by a non-medical transport service?” and “Could this patient have been safely transported to a clinic or urgent care center?” • Clinician decision may be compared to expert panel or physicians, or if patient seen in ED or admitted to hospital. • Agreement should be measured and reported with sensitivity and specificity. • Consensus definition of “medical necessity” and “appropriate decision” required, and should be clearly reported. • Clinician diagnosis can be compared to “gold standard,” such as diagnosis at 24 hours.
Process Outcomes	• Characteristics of patients who paramedics judged were “medically unnecessary” to transport to ED described. • Analyze cases to determine key aspects of decision making styles.

Appendix D

Element Number	Element Name	Required only with indication of:	Notes
eResponse.01	EMS Agency Number		Mandatory
eResponse.02	EMS Agency Name		
eResponse.03	Incident Number		
eResponse.04	EMS Response Number		
eResponse.05	Type of Service Requested		Mandatory
eResponse.07	Primary Role of the Unit		Mandatory
eResponse.09	Type of Response Delay		
eResponse.10	Type of Scene Delay		
eResponse.11	Type of Transport Delay		
eResponse.12	Type of Turn-Around Delay		
eResponse.13	EMS Vehicle (Unit) Number		Mandatory
eResponse.14	EMS Unit Call Sign		Mandatory
eResponse.15	Level of Care of This Unit		Mandatory
eResponse.23	Response Mode to Scene		Mandatory
eDispatch.01	Complaint Reported by Dispatch		Mandatory
eDispatch.02	EMD Performed		Submit if available from CAD
eCrew.02	Crew Member Level		
eTimes.01	PSAP Call Date/Time		Submit if available from CAD
eTimes.02	Dispatch Notified Date/Time		Submit if available from CAD
eTimes.03	Unit Notified by Dispatch Date/Time		Mandatory
eTimes.05	Unit En Route Date/Time		
eTimes.06	Unit Arrived on Scene Date/Time		
eTimes.07	Arrived at Patient Date/Time		
eTimes.08	Transfer of EMS Patient Care Date/Time	Transfer of Care	

eTimes.09	Unit Left Scene Date/Time	Pt Transport	
eTimes.11	Patient Arrived at Destination Date/Time	Pt Transport	
eTimes.12	Destination Patient Transfer of Care Date/Time	Pt Transport	
eTimes.13	Unit Back in Service Date/Time		Mandatory
ePatient.02	Last Name		
ePatient.03	First Name		
ePatient.05	Patient's Home Address		
ePatient.06	Patient's Home City		
ePatient.07	Patient's Home County		
ePatient.08	Patient's Home State		
ePatient.09	Patient's Home ZIP Code		
ePatient.13	Gender		
ePatient.14	Race		
ePatient.15	Age		
ePatient.16	Age Units		
ePatient.17	Date of Birth		If DOB not available, age or estimated age must be entered.
ePayment.01	Primary Method of Payment		
eScene.01	First EMS Unit on Scene		
eScene.06	Number of Patients at Scene		
eScene.07	Mass Casualty Incident		
eScene.08	Triage Classification for MCI Patient		
eScene.09	Incident Location Type		
eScene.10	Incident Facility Code		
eScene.15	Incident Street Address		
eScene.17	Incident City		
eScene.18	Incident State		
eScene.19	Incident ZIP Code		
eScene.21	Incident County		
eSituation.02	Possible Injury		
eSituation.04	Complaint		
eSituation.05	Duration of Complaint		
eSituation.06	Time Units of Duration of Complaint		
eSituation.09	Primary Symptom		
eSituation.10	Other Associated Symptoms		
eSituation.11	Provider's Primary Impression		

eSituation.12	Provider's Secondary Impressions		
eSituation.18	Date/Time Last Known Well	See Notes	Required for Stroke, Cardiac, Drowning, Injury
eInjury.01	Cause of Injury	Injury	
eInjury.02	Mechanism of Injury	Injury	
eInjury.03	Trauma Center Criteria	Injury	
eInjury.04	Vehicular, Pedestrian, or Other Injury Risk Factor	Injury	
eInjury.07	Use of Occupant Safety Equipment	Injury	
eInjury.08	Airbag Deployment	Injury	
eArrest.01	Cardiac Arrest	Cardiac	
eArrest.02	Cardiac Arrest Etiology	Cardiac	
eArrest.03	Resuscitation Attempted By EMS	Cardiac	
eArrest.04	Arrest Witnessed By	Cardiac	
eArrest.06	Who Provided CPR Prior to EMS Arrival	Cardiac	
eArrest.07	AED Use Prior to EMS Arrival	Cardiac	
eArrest.08	Who Used AED Prior to EMS Arrival	Cardiac	
eArrest.09	Type of CPR Provided	Cardiac	
eArrest.11	First Monitored Arrest Rhythm of the Patient	Cardiac	
eArrest.12	Any Return of Spontaneous Circulation	Cardiac	
eArrest.14	Date/Time of Cardiac Arrest	Cardiac	
eArrest.15	Date/Time Resuscitation Discontinued	Cardiac	
eArrest.16	Reason CPR/Resuscitation Discontinued	Cardiac	
eArrest.17	Cardiac Rhythm on Arrival at Destination	Cardiac	
eArrest.18	End of EMS Cardiac Arrest Event	Cardiac	
eArrest.19	Date/Time of Initial CPR	Cardiac	
eHistory.01	Barriers to Patient Care		
eHistory.06	Medication Allergies		
eHistory.08	Medical/Surgical History		
eHistory.12	Current Medications		
eHistory.17	Alcohol/Drug Use Indicators		
eNarrative.01	Patient Care Report Narrative		
eVitals.01	Date/Time Vital Signs Taken	Vitals	
eVitals.02	Obtained Prior to this Unit's EMS Care		If time vitals taken is before your agency arrives
eVitals.06	SBP (Systolic Blood Pressure)		

eVitals.07	DBP (Diastolic Blood Pressure)		
eVitals.10	Heart Rate		
eVitals.12	Pulse Oximetry		
eVitals.14	Respiratory Rate		
eVitals.15	Respiratory Effort		
eVitals.16	End Tidal Carbon Dioxide (ETCO2)		
eVitals.18	Blood Glucose Level	Stroke	
eVitals.19	Glasgow Coma Score-Eye		
eVitals.20	Glasgow Coma Score-Verbal		
eVitals.21	Glasgow Coma Score-Motor		
eVitals.23	Total Glasgow Coma Score		
eVitals.26	Level of Responsiveness (AVPU)		
eVitals.27	Pain Score		
eVitals.28	Pain Scale Type		
eVitals.29	Stroke Scale Score	Stroke	Required for Stroke
eVitals.30	Stroke Scale Type	Stroke	Required for Stroke
eExam.01	Body Weight in Kilograms		
eExam.03	Date/Time of Assessment	Stroke	Required for Stroke
eExam.20	Neurological Assessment	Stroke	Required for Stroke
eExam.21	Stroke/CVA Symptoms Resolved	Stroke	Required for Stroke
eProtocols.01	Protocols Used		
eMedications.01	Date/Time Medication Administered	Medication	
eMedications.02	Medication Administered Prior to this Unit's EMS Care		
eMedications.03	Medication Given		
eMedications.04	Medication Administered Route	Medication	
eMedications.05	Medication Dosage	Medication	
eMedications.06	Medication Dosage Units	Medication	
eMedications.07	Response to Medication	Medication	
eProcedures.01	Date/Time Procedure Performed	Procedure	
eProcedures.02	Procedure Performed Prior to this Unit's EMS Care		
eProcedures.03	Procedure		
eProcedures.05	Number of Procedure Attempts	Procedure	
eProcedures.06	Procedure Successful	Procedure	
eProcedures.08	Response to Procedure	Procedure	
eAirway.01	Indications for Invasive Airway	Airway	
eAirway.04	Airway Device Placement Confirmed Method	Airway	

eAirway.08	Airway Complications Encountered	Airway	
eDisposition.02	Destination/Transferred To, Code	Transported	
eDisposition.05	Destination State	Transported	
eDisposition.06	Destination County	Transported	
eDisposition.07	Destination ZIP Code	Transported	
eDisposition.12	Incident/Patient Disposition	Transported	
eDisposition.16	EMS Transport Method	Transported	
eDisposition.19	Final Patient Acuity	Transported	
eDisposition.20	Reason for Choosing Destination	Transported	
eDisposition.21	Type of Destination	Transported	
eDisposition.24	Destination Team Pre-Arrival Activation	See Note*	Required for time sensitive conditions: STEMI, Stoke, Cardiac Arrest, Trauma
eDisposition.25	Date/Time of Destination Prearrival Activation	See Note*	Required for time sensitive conditions: STEMI, Stoke, Cardiac Arrest, Trauma
itOutcome.023	Community Health Follow up Outcome	See Note*	Selection: -Follow-up Successful -No Follow-up Attempted -Follow-up Attempted-unable to contact -No method to contact patient.
*Required - Custom element or collection procedure			